Unit 12

Coordination and Control

Long Answer Questions

Q.1 What do you mean by coordination? Explain its mechanism with examples.

Ans. Coordination

Definition

The coordination is developed when body works as one unit, in which its different organs and systems cooperate and work in harmony with each other.

Explanation

The tissues and organs in the bodies of multicellular organisms do not work independent of each other. They work together performing their many tasks as the needs of the whole body. This means that these activities are coordinated. The process is called coordination. Coordination also enables the organism to respond to happenings in the world around it.



Example No. 1

One familiar example of coordination is the way in which muscles work together during movement. When a boy runs to catch a ball, he uses hundred of muscles to move his arms, legs and back. His nervous system uses information from his sense organs and coordinates these muscles. Due to this coordination, the muscles contract in the correct sequence, power, and length of time. But that is not all. Such activities involve many other kinds of coordination. For example, breathing and heartbeat rates are increased, blood pressure is adjusted, and extra heat is removed fast from the body.

Example No. 2

When we are writing something, our hands and fingers work in collaboration with our muscles, eyes, thoughts etc. and then very intricate movements result.

Q.2 Name the types of coordination. Explain the components of a coordinated action in detail.

Ans. TYPES OF COORDINATION:

There are two types of coordination in organisms:

(i) Nervous coordination

It is brought about by nervous system.

(ii) Chemical coordination

It is brought about by endocrine system.

Animals have both the nervous and chemical coordination systems in their bodies while **plants** and other organisms have only chemical coordination.

Components of coordinated action

A coordinated action has five components.

i. Stimuli

Definition

A stimulus is defined as any change in environment (external and internal), which can provoke a response in organism.

Examples

Examples of stimuli are heat, cold, pressure, sound waves, presence of chemicals, microbial infections etc.

ii. Receptors

Definition

The organs, tissues or cells which are specifically built to detect particular type of stimuli are called receptors.

Examples

Sound waves are detected by ears, light is detected by eyes, chemicals in air are detected by nose.

iii. Coordinators

Definition

These are the organs that receive information from receptors and send messages to particular organs for proper action.

Examples

(i) In nervous coordination, brain and spinal cord are coordinators. They receive information and send messages through neurons in the form of nerve impulses.

(ii) On the other hand, in chemical coordination, various endocrine glands play the role of coordinators. They receive information in the form of various chemicals and send messages by secreting particular hormones in blood.

iv. Effectors

Definition

These are the parts of body which receive messages from coordinators and produce particular responses.

Examples

(i) In nervous coordination, neurons carry messages from coordinators (brain and spinal cord) to muscles and glands, which act as effectors.

(ii) In chemical coordination, particular hormones carry messages from coordinators, (endocrine glands) to particular target tissues, which act as effectors. For some hormones, nephrons act as effectors. Similarly, bones and liver act as effectors for many hormones.

v. Response.

Definition

On receiving the message from coordinators, the effectors perform action. This action is called response. Usually, nervous coordination produces immediate but short living responses while chemical coordination produces slow but long living responses.

Example- Pulling our hand away from something very hot.

The movement of the flower of sunflower towards light are the examples of responses.

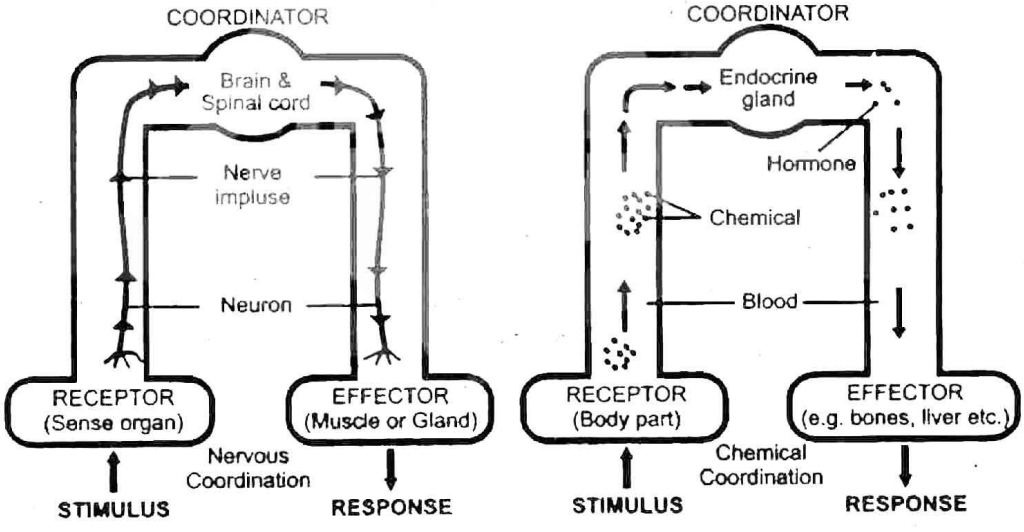


Figure 12.1: Neurons and chemical coordination

Q.3 (a) What do you know about human nervous system?

(b) Explain neuron in detail

Ans. (a) Human Nervous system

The nervous system in man and in other higher animals is composed of two major components.

(1) Central Nervous System (C.N.S)

A system which comprises of brain and spinal cord is called central nervous system.

(2) Peripheral Nervous System (P.N.S)

Peripheral nervous system (P.N.S) consists of nerves that arise from central nervous system and spread in different parts of body.

All these components of human nervous system are made of neurons.

(b) Neuron or Nerve cell

Introduction

Nerve cell or neuron is the unit of nervous system. All the components of human nervous system are made of neurons.

Human Nervous system

The human nervous system consists of billions of neurons plus supporting (neuroglial) cells.

Function of Neurons

Neurons are specialized cells that are able to conduct nerve impulses from receptors to co-ordinators and from coordinators to effectors. In this way, they communicate with each other and with other types of body cells.

Nerve impulse

A nerve impulse is a wave of electrochemical changes that travels along the length of neuron.

Structure of neuron

Neuron consists of:

(a) Cell body

The nucleus and most of the cytoplasm of a neuron is located in its cell body.

(b) Dendrites and axon

Different processes extend out from the cell body. These are called dendrites and axon

(c) Direction of nerve impulses:

Dendrites conduct impulses towards the cell body and axons conduct impulses away from the cell body.

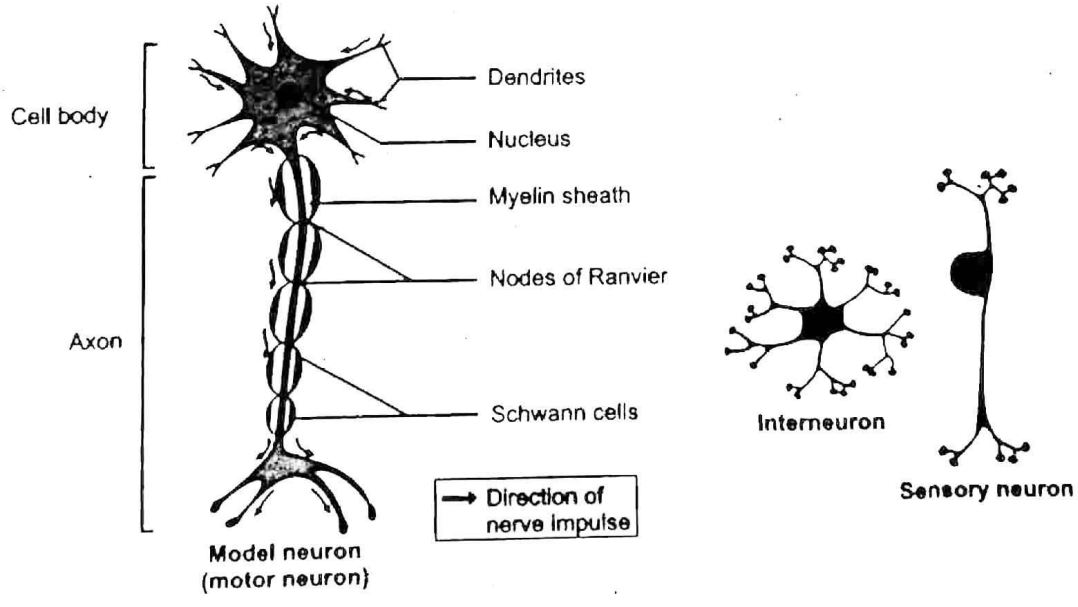


Figure 12.2: Neurons

(d) Schwann Cells

Schwann cells are special neuroglial cells located at regular intervals along axons.

(e) Myelin Sheath

In some neurons, Schwann cells secrete a fatty layer called myelin sheath and it is located over axon. Myelin sheath is an insulator so the membrane coated with this sheath does not conduct nerve impulse. In such a neuron, impulses "jump" over the areas of myelin sheath going from node to node. Such impulses are called **saltatory** (jumping) impulses.

Function of Saltatory Impulses:

This increases the speed of nerve impulses.

(f) Nodes of Ranvier

Between the areas of myelin on an axon, there are non-myelinated points called the nodes of Ranvier.

Types of Neuron

On the basis of their functions, neurons are of three types:

(a) Sensory neurons conduct sensory information (nerve impulse) from receptors towards the CNS. Sensory neurons have one dendrite and one axon.

(b) Interneurons form brain and spinal cord. They receive information, interpret them and stimulate motor neurons. They have many dendrites and axons.

(c) Motor neurons carry information from interneurons to muscles or glands (effectors). They have many dendrites but only one axon.

Q.4 Define nerve. Explain its types. **(Board 2014)**

Ans. Nerve

A nerve means the union of several axons that are enveloped by a covering made of lipid.

Types of nerves

Based on the property of axons, the nerves are classified into three types:

1. Sensory nerves

They contain the axons of sensory neurons only.

2. Motor nerves

They contain the axons of motor neurons only.

3. Mixed nerves

They contain the axons of both i.e. sensory and motor neurons.

Q.5 Explain Central Nervous System (C.N.S) in detail.

Ans. Parts of CNS

CNS consists of two parts:

(i) Brain **(ii) Spinal cord**

(i) Brain

Introduction

In animals, all life activities are under the control of brain. The structure of brain is suitable to perform this function.

Location

Brain is situated inside a bony cranium i.e. a part of skull.

Meninges

Inside cranium, brain is covered by three layers called meninges.

Function of meninges

Meninges protect brain and also provide nutrients and oxygen to brain tissues through their capillaries.

Ventricles

The brain contains fluid filled ventricles that are continuous with the central canal of spinal cord.

Cerebrospinal fluid (CSF)

Fluid within ventricles and central canal is called cerebrospinal fluid (CSF).

Function of CSF

It provides cushioning and ions to brain and spinal cord.

Division of Brain

There are three main regions in the brain of humans and other vertebrates. These are forebrain, midbrain, and hindbrain.

(a) Forebrain **(Board 2013)**

Introduction

Forebrain is the largest area of brain. It is most highly developed in humans.

Parts of Forebrain

(i) Thalamus

Location

It lies just below the cerebrum.

Functions

It serves as a relay centre between various parts of brain and spinal cord. It also receives and modifies sensory impulses (except from nose) before they travel to cerebrum.
Thalamus is also involved in pain perception and consciousness i.e. sleep and awakening.

(ii) Hypothalamus

Location

It lies above midbrain and just below thalamus.

Size

In humans, it is about the size of an almond.

Function

(a) The most important function of hypothalamus is to link nervous system and endocrine system.

(b) It controls the secretions of pituitary gland.

(c) It controls feelings such as rage, pain, pleasure and sorrow.

(iii) Cerebrum

It is the largest part of forebrain.

Function

It controls skeletal muscles, thinking, intelligence and emotions.

Cerebral hemispheres

Cerebrum is divided into two cerebral hemispheres.

Olfactory Bulbs

The anterior parts of cerebral hemispheres are called olfactory bulbs which receive impulses from olfactory nerves and create the sensation of smell.

Cerebral cortex

The upper layer of cerebral hemisphere i.e. cerebral cortex consists of grey matter.

Grey matter

The grey matter of nervous system consists of cell bodies and non-myelinated axons.

White matter

Beneath this layer is present the white matter. The white matter of nervous system consists of myelinated axons. Cerebral cortex has a large surface area and is folded in order to fit in skull.

Lobes of cerebral cortex

It is divided into four lobes:

Lobe	Functions
Frontal	Controls motor functions, permits conscious control of skeletal muscles and coordinates movements involved in speech
Parietal	Contains sensory areas that receive impulses from skin
Occipital	Receives and analyzes visual information
Temporal	Concerned with hearing and smell

Hippocampus

It is a structure that is deep in the cerebrum. It functions for the formation of new memories. People with a damaged hippocampus cannot remember things that occurred after that but can remember things that occurred before damage.

(b) MIDBRAIN

Location:

Midbrain lies between hindbrain and forebrain and it connects the two.

Functions:

1. It receives sensory information and sends it to the appropriate parts of fore brain.
2. Midbrain also controls some auditory reflexes and posture.

(c) HINDBRAIN / What are parts of hind brain and how they perform their function?

Parts of hindbrain **(Board 2014)**

Hindbrain consists of three major parts:

1. Medulla Oblongata

Location

It lies on the top of spinal cord.

Functions

(i) It controls breathing, heart rate and blood pressure.

(ii) It also controls many reflexes such as vomiting, coughing, sneezing etc.

Information that passes between spinal cord and the rest of brain pass through medulla.

2. Cerebellum

Location

It is behind the medulla oblongata.

Function

It coordinates muscle movements.

3. Pons

Location

It is present on the top of medulla oblongata.

Function

(i) It assists medulla in controlling breathing.

(ii) It also serves as a connection between cerebellum and spinal cord.

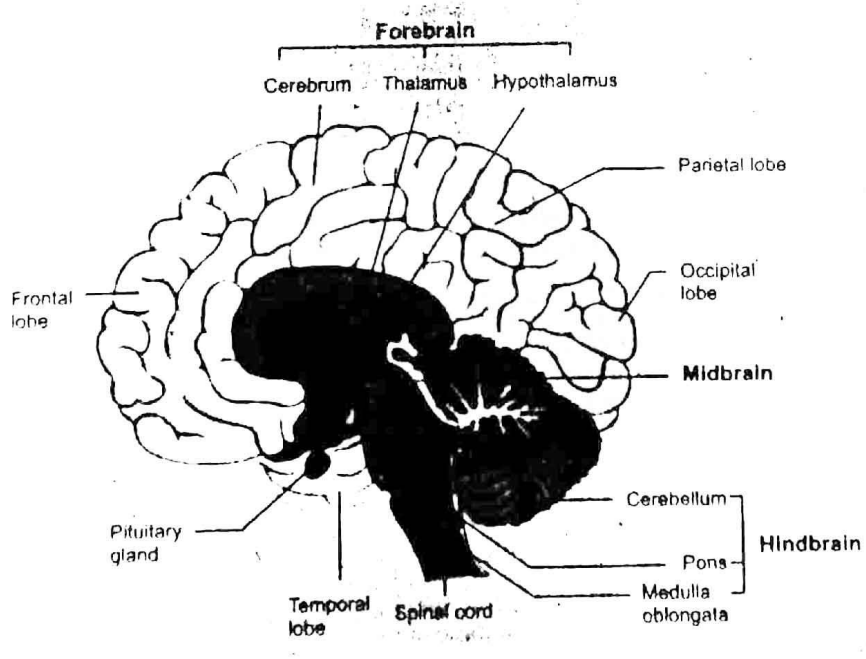


Figure 12.3: Structure of human brain

(ii) SPINAL CORD

Definition

It is a continuation of medulla oblongata.

Location

It starts from brain stem and extends to lower back.

STRUCTURE

The spinal cord is infact a tubular bundle of nerves. It is the continuation of medulla oblongata.

Length

It is roughly 40 cm long.

Width

It is about as wide as our thumb for most of its length.

Meninges

Like brain, spinal cord is also covered by meninges.

Protection of spinal cord

The vertebral column surrounds and protects spinal cord.

Outer Region

The outer region of spinal cord is made of white matter containing myelinated axons.

Central Region

The central region is butterfly-shaped that surrounds the central canal.

Composition

It is made of grey matter containing neuron cell bodies.

SPINAL NERVES

31 pairs of spinal nerves arise along spinal cord. These are "mixed" nerves because each contains axons of both sensory and motor neurons.

ROOTS OF SPINAL NERVES

At the point where a spinal nerve arises from spinal cord, there are two roots of spinal nerves. Both roots unite and form one mixed spinal nerve.

Dorsal root

The dorsal root contains sensory axons and a ganglion where cell bodies are located.

Ventral root

The ventral root contains axons of motor neurons.

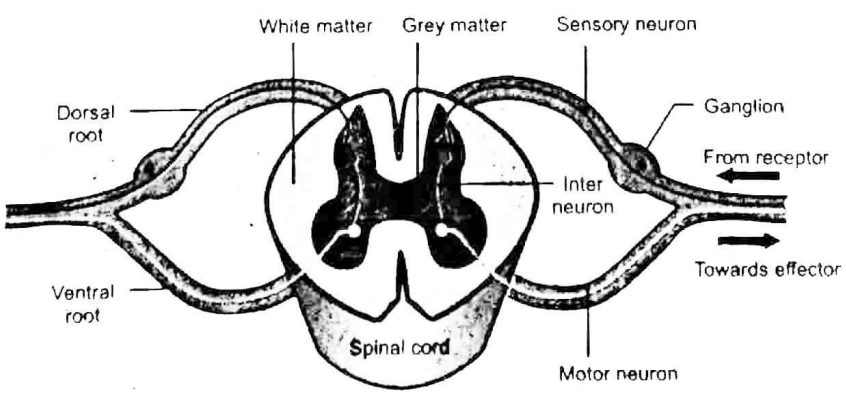


Figure 12.4: Spinal Cord and Spinal Nerves

Functions of Spinal Cord

1. It serves as link between body parts and brain. Spinal cord transmits nerve impulses from body parts to brain and from brain to the body parts.
2. Spinal cord also acts as a coordinator, responsible for some simple reflexes.

Q.6 Explain Peripheral Nervous System (PNS) in detail.

Ans. PERIPHERAL NERVOUS SYSTEM (PNS)

Components of PNS:

The PNS is composed of nerves and ganglia.

Ganglia

Ganglia are the clusters of neuron cell bodies outside the nervous system.

Number of cranial and spinal nerves.

Humans have 12 pairs of cranial nerves and 31 pairs of spinal nerves.

Types of nerves

Some cranial nerves are sensory, some are motor and some are mixed .
On the other hand, all spinal nerves are mixed nerves.

Pathways in PNS formed by Nerves

The cranial and spinal nerves make two pathways:
Sensory pathway which conducts impulses from receptors to CNS.
Motor pathway which conducts impulses from CNS to effectors.

Systems of Motor pathway:

Motor Pathway makes two systems:

1. **Somatic Nervous system**

It is responsible for the conscious and voluntary actions. It includes all of the motor neurons that conduct impulses from CNS to skeletal muscles.

2. **Autonomic Nervous System**

It is responsible for the activities, which are not under conscious control. It consists of motor neurons that send impulses to cardiac muscles, smooth muscle and glands.

Types of autonomic Nervous system

Autonomic nervous system comprises of sympathetic system and parasympathetic system.

(i) Sympathetic nervous system

This system prepares body to deal with emergency situations. This is often called the fight or flight responses. During an emergency situation, this system takes necessary actions. For example; it dilates pupils, accelerates heartbeat, increases breathing rate and inhibits digestion.

(ii) Parasympathetic nervous system

When stress ends, the **parasympathetic nervous system** takes action and normalizes all the functions. It causes pupil to contract, promotes digestion, and slows the rate of heartbeat and breathing rate.

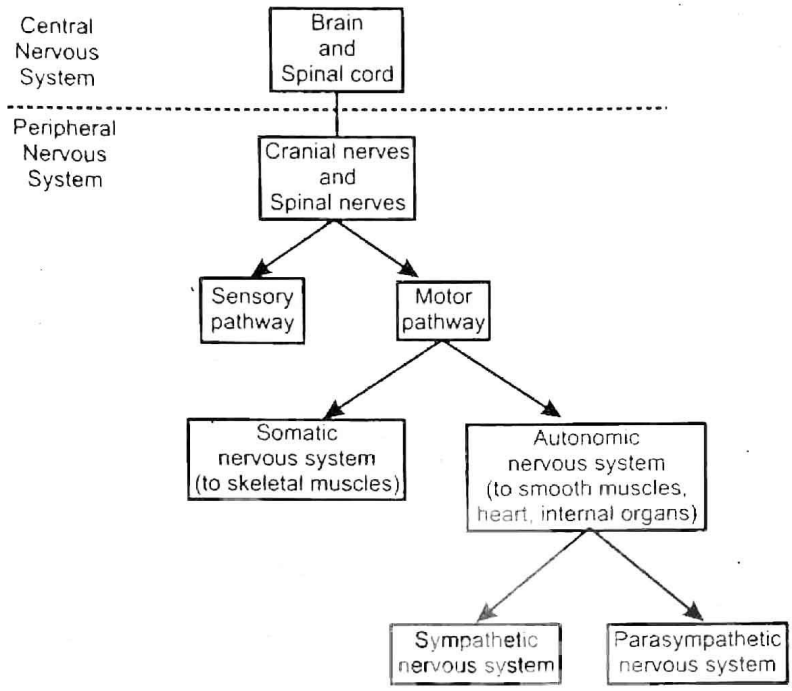


Figure 12.5: Division of the nervous system

Q.7 Define reflex action. Explain it with an example

Ans. REFLEX ACTION

Definition

Sometimes the involuntary response produced by the CNS is very quick. Such a response is called reflex action.

Types of action

When CNS sends impulses to muscles and glands, two types of actions or responses result.

Voluntary Actions

The higher centers of brain control the conscious action or voluntary actions.

Or

The actions which are done by our will are called voluntary actions.

Examples

Picking of book from the table, to take meal three times a day etc.

Involuntary Actions

Definition

When impulses are not passed to the higher centres of brain, it results in responses which are not under conscious control. Such responses are called involuntary actions.

Or

The actions which are not done by our will are called involuntary actions.

Examples

Heart beat, blood pressure etc.

Reflex arc

The pathway followed by the nerve impulses for producing a reflex action is called reflex arc.

Example of Reflex Action

The most common example of reflex action is the withdrawal of hand after touching a hot object.

Explanation

In this reflex action, spinal cord acts as coordinator. Heat stimulates temperature and pain receptors in skin. A nerve impulse is generated which is carried by sensory neurons to the interneurons of spinal cord.

From interneurons, the impulse is passed to the motor neurons which carry it to the muscles of the arm. As a result, the muscles contract to withdraw hand. During it, other interneurons transmit nerve impulses up to brain so that the person becomes aware of pain and what happened.

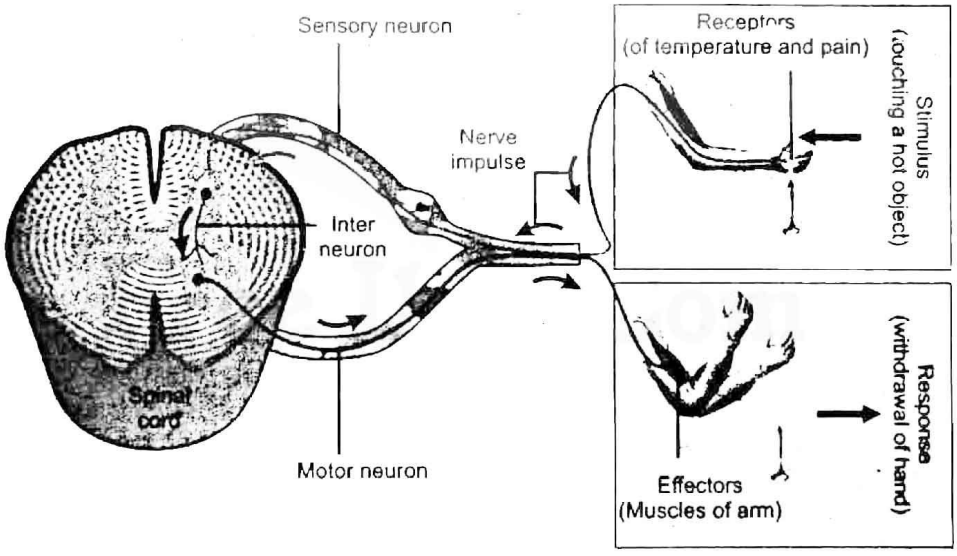


Figure 12.6: Reflex Arc in Reflex Action

Q.8 Describe structure and mechanism of function of human eye.

Ans. Human Eye

Location

Our eyes are located in small portions of skull known as the orbits or eye sockets.

External Structure of Eye

(i) Eyelids

Functions

Eyelids wipe eyes and prevent dehydration.

They spread tears on eyes which contain substances for fighting bacterial infections.

(ii) Eyelashes

Function

Eyelashes prevent fine particles from entering eye.

Internal structure of eye

The internal structure of eye can be divided into three main layers;

(i) Outer layer

The outer layer of eyeball consists of sclera and cornea.

(a) Sclera

It consists of dense connective tissue.

Functions

Sclera gives eye most of its white colour.

It protects the inner components of eye.

It maintains the shape of eye.

(b) Cornea

In the front, sclera forms the transparent cornea.

Function

Cornea admits light to the interior of eye and bends light rays so that they can be brought to a focus.

(ii) Middle Layer Choroid

The middle layer is called choroid.

Structure

It contains blood vessels.

Function

It gives the inner eye a dark colour. The dark colour prevents disruptive reflections within eye.

IRIS

Behind cornea, choroid bends to form a muscular ring called iris.

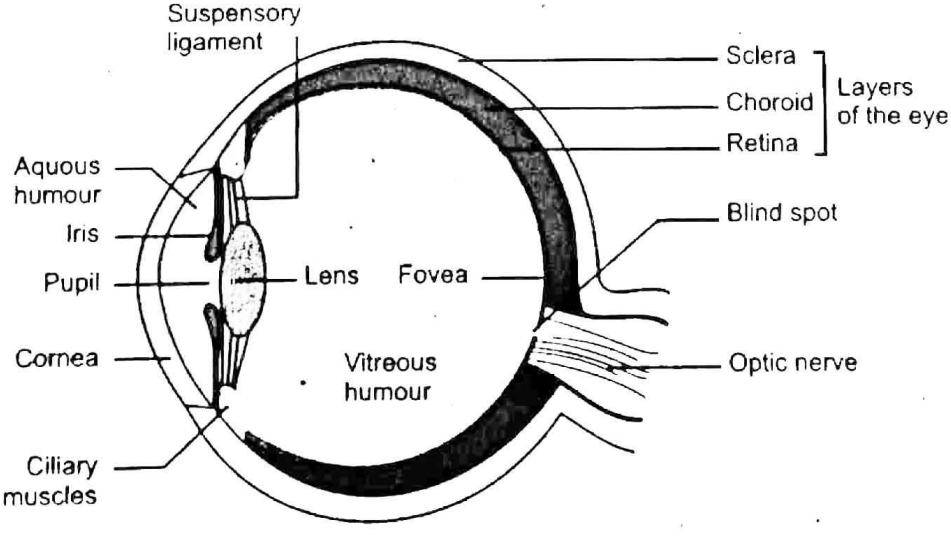


Figure 12.7: Structure of human eye

Pupil

There is a round hole, called pupil, in the centre of iris. After striking the cornea, light passes through the pupil.

Size

The size of pupil is adjusted by the muscles of iris.

Function

Pupil constricts in bright light when the circular muscles of iris contract Pupil dilates in dim light when the radial muscles of iris contract.

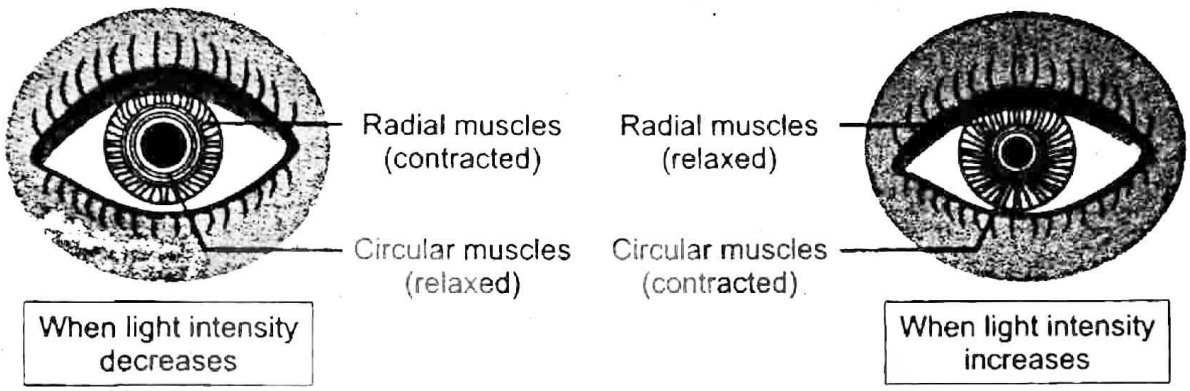


Figure 12.8: Contraction and dilation of pupil

Lens

Behind iris, there is a convex lens.

Function

It focuses light on the retina.

Ciliary muscles and Suspensory Ligaments

Lens is attached to ciliary muscles of eye via/through a ring of suspensory ligament.

Function

To see an object far clearly that is away, ciliary muscles are relaxed and lens becomes less convex. When ciliary muscles contract, lens becomes more convex and round.

(iii)INNER LAYER-RETINA

The inner layer is sensory and is called retina. It contains the photosensitive cells called rods and cones and associated neurons.

Rods

These are sensitive to dim light.

Cones

These are sensitive to bright light and they distinguish different colours.

Points on Retina

Retina has two points, fovea and optic disc.

Fovea

Fovea is a dip in retina directly opposite to lens and is densely packed with cone cells.

Function

It is largely responsible for colour vision and sharpness.

OPTIC DISC

Optic disc is a point on retina where the optic nerve enters retina.

Blind spot

There are no rods and cones at this point, that is why it is also referred to as the blind spot.

Chambers

The iris divides the cavity of eye into two chambers.

Anterior chamber

The anterior chamber is in front of iris i.e. between cornea and iris.

Aqueous humour

The anterior chamber contains a clear fluid known as aqueous humour.

Posterior chamber

The posterior chamber is between iris and retina.

VITREOUS HUMOUR

The posterior chamber contains a jelly – like fluid known as vitreous humour.

Function

It helps to maintain the shape of eye and suspends the delicate lens.

MECHANISM OF VISION

Light from objects enters eye and is refracted when it passes through cornea, aqueous humour, lens and vitreous humour. Lens also focuses light on retina. As a result, the image falls on retina. Rods and cones generate nerve impulses in the optic nerve. These impulses are carried to the brain, which makes the sensation of the vision.

Q.9 Explain the disorders of Eye. **(Board 2013-14)**

Ans. Following are the disorders of eye.

1. Night Blindness

Rods contain a pigment called rhodopsin. When light falls on rhodopsin, it breaks for generating a nerve impulse. In the absence of light, the breakdown products are again converted into rhodopsin. Body synthesizes rhodopsin from vitamin A and that is why the deficiency of vitamin A causes poor night vision. This problem is called night blindness.

2. Colour Blindness

Cones contain a pigment known as iodopsin. There are three main types of cones and each type has a specific iodopsin. Each type of cone recognizes one of the three primary colours i.e. blue, green and red. If any type of the cones is not working well, it becomes difficult to recognize that colour. Such person is not able to distinguish different colours. This disease is called colour blindness and is a genetic problem.

3. Myopia (Short sightedness)

The elongation of eyeball results in myopia. Such persons are not able to see distant objects clearly. The image of a distant object is formed in front of retina.

Cure

This problem can be rectified by using concave lens.

4. Hypermetropia (Long sightedness)

It happens when eyeball shortens. Such persons are not able to see near objects clearly. The image is formed behind retina.

Cure

Convex lens is used to rectify this problem.

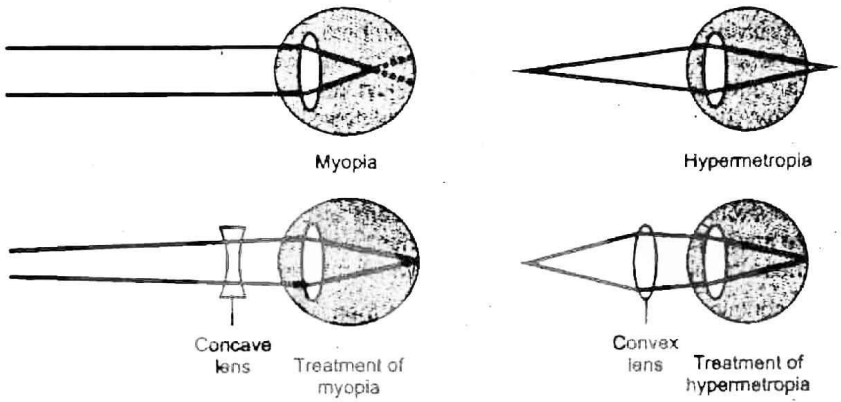


Figure 12.9: Myopia and Hypermetropia

Q.10 What is the contribution of Muslim scientists in the discovery and cure of eye diseases?

Ans. Ali ibn Isa (950-1012) was a famous Arab scientist. He wrote three books on ophthalmology (study of the diseases and surgery of eyes). He described 130 eye diseases and prescribed 143 drugs to treat these diseases.

Ibn al-Haytham (965 – 1039) an Arab scientist, made significant contributions to the principles of eye and vision. He is regarded as the father of optics (study of the behaviour of light). His "Book of Optics" correctly explained and proved the modern theory of vision. He discussed the topics of medicine and eye surgery in his book. He made several improvements to eye surgery and accurately described the process of sight, the structure of eye, image formation in eye and visual system. Ibn al-Haytham also described the principles of pinhole camera.

Q.11 Explain the structure of human ear in detail. Describe its functioning in balancing of body.

Ans. Ear

Hearing is as important as vision. Our ear helps us in hearing and also to maintain the balance or equilibrium of our body.

Structure of Ear

Ear has three main parts i.e.

(a) External ear (b) Middle Ear (c) Internal Ear

(a) External Ear

Parts of external ear

External ear consists of pinna, auditory canal and eardrum (tympanum).

PINNA

Pinna is the broad external part, made of cartilage and covered with skin.

AUDITORY CANAL

Pinna helps to direct sound waves into auditory canal. There are special glands in the walls of auditory canal which produce wax.

Function of hair and wax

The hair and the wax in auditory canal protect ear from small insects, germs and dust. They help to maintain the temperature and dampness of auditory canal.

EAR DRUM

Auditory canal ends in ear drum. This thin membrane separates external ear from the middle ear.

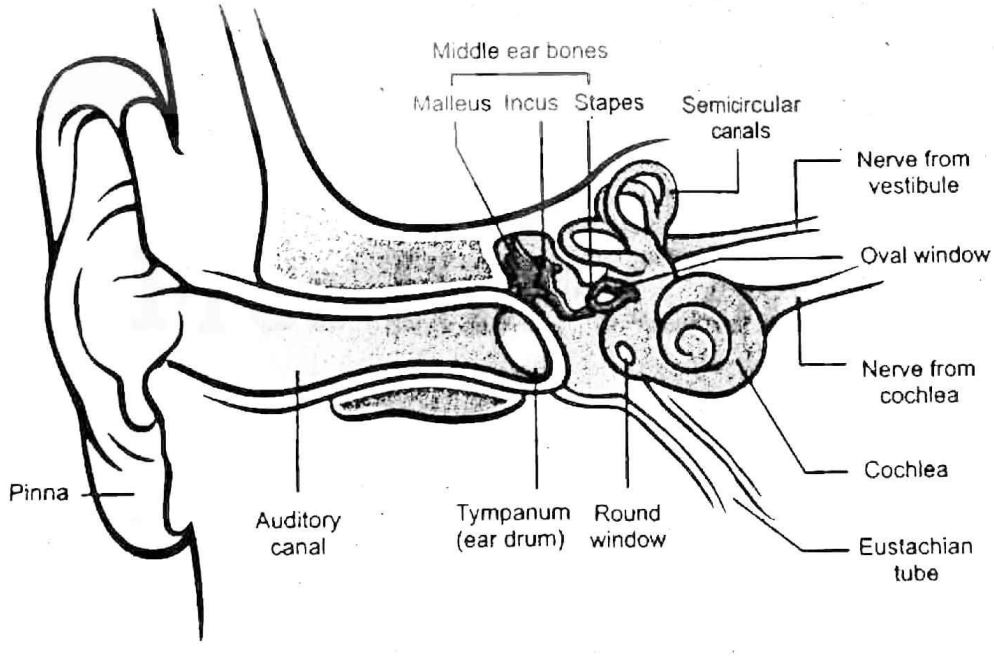


Figure 12.10: Structure of human Ear

(b) Middle ear

Middle ear is a chamber after external ear.

Bones

Three small bones, called middle ear ossicles, are present in a chain in middle ear. These moveble bones include malleus, incus and stapes. These three bones are collectively called middle ear ossicles.

Malleus

It is attached with eardrum, then comes incus and finally stapes.

Stapes

It is the smallest bone of body.

Oval window

Stapes is connected with a membrane called oval window. Oval window separates middle ear from inner ear. Middle ear also communicates with the nasal cavity through eustachian tube.

Function of Eustachian tube.

This tube regulates the air pressure on both sides of ear drum.

(c) Inner ear

Parts of inner Ear

Inner ear consists of three parts i.e. vestibule, semicircular canals and cochlea.

Vestibule

It is present in the centre of inner ear.

Semicircular canals

Three canals called semicircular canals are posterior to the vestibule.

Cochlea

The cochlea is made of three ducts and wraps itself into a coiled tube.

Sound Receptor cells

Sound receptor cells are present within the middle duct of cochlea.

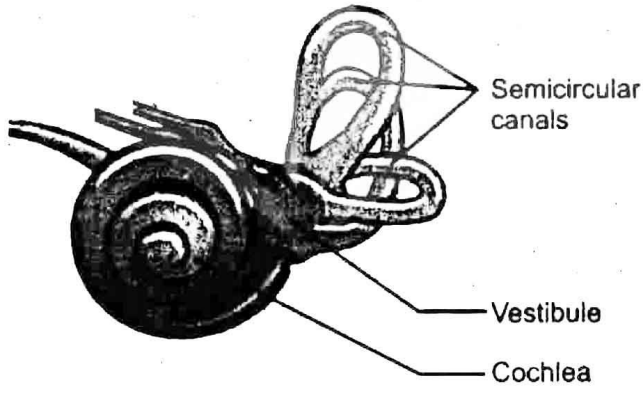


Figure: 12.11: Structure of the inner Ear

The process of hearing

The pinna of the external ear focuses and directs sound waves into auditory canal. The sound waves strike ear drum and produce vibrations in it. From ear drum, the vibrations strike middle ear and produce further vibrations in malleus, incus and then stapes. From stapes, the vibrations strike the oval window and then reach the fluid-filled middle duct of cochlea. The fluid of cochlea is moved and receptor cells are stimulated. The receptor cells generate a nerve impulse, which travels to brain and is interpreted as sound.

Ears maintain the balance of body

Semicircular canal and vestibule help to maintain the balance of body. Semicircular canals contain sensory nerves which can detect any movement of head. Vestibule can detect any change in the posture of body. The neurons coming from these two receptors reach cerebellum through the auditory nerve.

Q.12 What is endocrine system. Describe important endocrine glands.

Ans. Endocrine Glands

Introduction

Endocrine system regulates the activities such as growth, reproduction, maintenance of glucose concentration in blood, reabsorption of water in kidneys etc.

Hormones

Endocrine system uses chemicals to communicate with its effectors. These chemicals are known as hormones. A hormone is a specific messenger molecule synthesized and secreted by endocrine gland.

Types of Gland

They are of two types:

(a) Endocrine Gland

These glands are ductless and release their secretions (hormones) directly into the blood stream. Blood carries the hormone to the target organs or tissues upon which they act.

(b) Exocrine glands

Many glands in our body are exocrine. Such glands have ducts for releasing their secretions e.g. digestive glands, skin glands etc.

Important Endocrine glands

1. Pituitary Gland

Structure

It is a pea-shaped gland.

Location

It is attached to the hypothalamus of brain.

Hormones

Many hormones of pituitary gland influence the secretions of other endocrine glands. However some hormones of this gland act directly on various tissues of body.

Lobes of pituitary gland

There are two lobes of pituitary gland.

(a) Anterior lobe

Hormones

It produces many hormones.

(i) SOMATOTROPHIN

One of its important hormone is somatotrophin (growth hormone).

Function

It promotes the growth of body.

Deficiency – Dwarfism

If the production of this hormone is diminished during growing age, the rate of growth decreases. This condition is called dwarfism.

Over Production-Gigantism

If this hormone is excessively produced after growing age, it leads to gigantism (very tall and overweight).

Acromegaly

If this hormone is excessively produced after growing age, internal organs and body extremities alone grow large. This condition is known as acromegaly. Such persons will have large hand, feet and jawbones.

(ii) Thyroid stimulating hormone

Another important hormone secreted by the anterior lobe of pituitary gland is Thyroid Stimulating Hormone (TSH).

Function

It stimulates thyroid gland to secrete its hormones. The remaining hormones of anterior lobe influence reproductive organs and also control adrenal glands.

(b) Posterior Lobe

(a) Hormones

The posterior lobe of pituitary gland stores and secretes two hormones i.e. oxytocin and vasopressin (Antidiuretic Hormone ADH).

(b) Production of Hormones

These hormones are produced by hypothalamus.

Functions

(i) Vasopressin

(a) Retaining water and less amount of urine

It increases the rate of reabsorption of water from nephrons. When we have low amount of water in body fluids, pituitary gland secretes vasopressin and so more reabsorption of water occurs from nephrons into blood. In this way, body retains water and less amount of urine is produced.

(b) Less water reabsorption and more amount of urine

On the other hand, when body fluids have more than normal water, there is a decline in the secretion of this hormone. If pituitary gland does not secrete this hormone in the required amount, less water is reabsorbed from nephrons and there is excessive loss of water through urine. This condition is known as diabetes insipidus.

(ii) Oxytocin

This hormone stimulates the contraction of uterus walls in mothers for child birth.

It is necessary for the ejection of milk from breast.

2. Thyroid Gland

This is the largest endocrine gland in the human body. It produces two hormones.

Location

It is present in neck region below the larynx.

i. Thyroxin Hormone

It produces a hormone thyroxin. Iodine is required for the production of this hormone.

Deficiency

If a person lacks iodine in diet, thyroid gland cannot make its hormone. In this condition, thyroid gland enlarges. This disorder is called goitre.

Overproduction of Hormone

Hypothyroidism is caused by the under production of thyroxin.

Effects

Low energy production in body, slowing down of heartbeat.

Over –production

Hyperthyroidism is caused by over-production of thyroxin.

Effects / Symptoms

(i) Increase in energy production

(ii) Increase heart beat

(iii) Frequent sweating

(iv) Shivering of hands

Function of Thyroxin

Thyroxin increases the breakdown of food (oxidation) and releases energy in body. It is also responsible for the growth of body.

ii. Calcitonin Hormone

The thyroid gland produces another hormone called calcitonin.

Effects

It decreases the level of calcium ions in blood and promotes the absorption of calcium from blood into bones.

3. Parathyroid gland

Location

These are four glands situated on the posterior side of thyroid gland.

Hormone

This gland produces a hormone known as parathormone.

Function

It increases the level of calcium ions in blood.

Over – production

When there is an increased production of parathormone, more than normal calcium salts are absorbed from the bones and added to blood. Consequently, the bones become brittle.

Deficiency

If there is deficiency in the production of parathormone, blood calcium level falls. It leads to tetany which affects the function of muscles.

4. ADRENAL GLANDS

Location

Two adrenal glands are situated above the kidneys.

Each adrenal gland consists of two parts;

i. Cortex

The outer part is cortex.

ii. Medulla

The inner part is medulla.

Hormone of adrenal medulla

Adrenal medulla secretes a hormone called epinephrine or adrenaline in response to stress.

Emergency Hormone

It prepares our body to overcome emergency situation. Therefore adrenaline is also termed as an emergency hormone.

Hormone of Adrenal cortex

The adrenal cortex secretes many hormones called corticosteroids which maintain the balance of salts and water in blood.

5. Pancreas

This organ has two functions:

Pancreas as Exocrine Gland

The major part of pancreas is a ducted (exocrine) gland. This portion secretes digestive enzymes through a duct into the small intestine.

Pancreas as Endocrine Gland

Some portions of pancreas serve as ductless (endocrine) gland. This portion contains groups of endocrine cells referred to as Islets of Langerhans.

Hormones of Islets of Langerhans

The islets secrete two hormones i.e. insulin and glucagon.

(i) GLUCAGON

It influences the liver to release glucose in blood and blood glucose concentration rises.

(ii) INSULIN

It influences the liver to take excess glucose from blood and so the blood glucose concentration falls.

Deficiency of insulin

If a person's pancreas does not make normal quantity of insulin, the blood glucose concentration rises and the person suffers from diabetes mellitus.

Symptoms of diabetes

Persons with diabetes have:

i. Loss of weight
ii. Weakening of muscles
iii. Tiredness

Diabetes can be controlled by insulin administration. Formerly insulin extracted from animals was used for this purpose. But now human insulin produced from bacteria through genetic engineering is available.

6. GONADS

Definition

Testes and ovaries are the male and female reproductive organs respectively. They are collectively called gonads.

Testes

Testes secrete hormones e.g. testosterone, which is responsible for the development of male secondary sex characters such as growth of hair on face and coarseness of voice etc.

Ovaries

Ovaries secrete estrogen and progesterone which are responsible for the development of female secondary characters such as the development of breast.

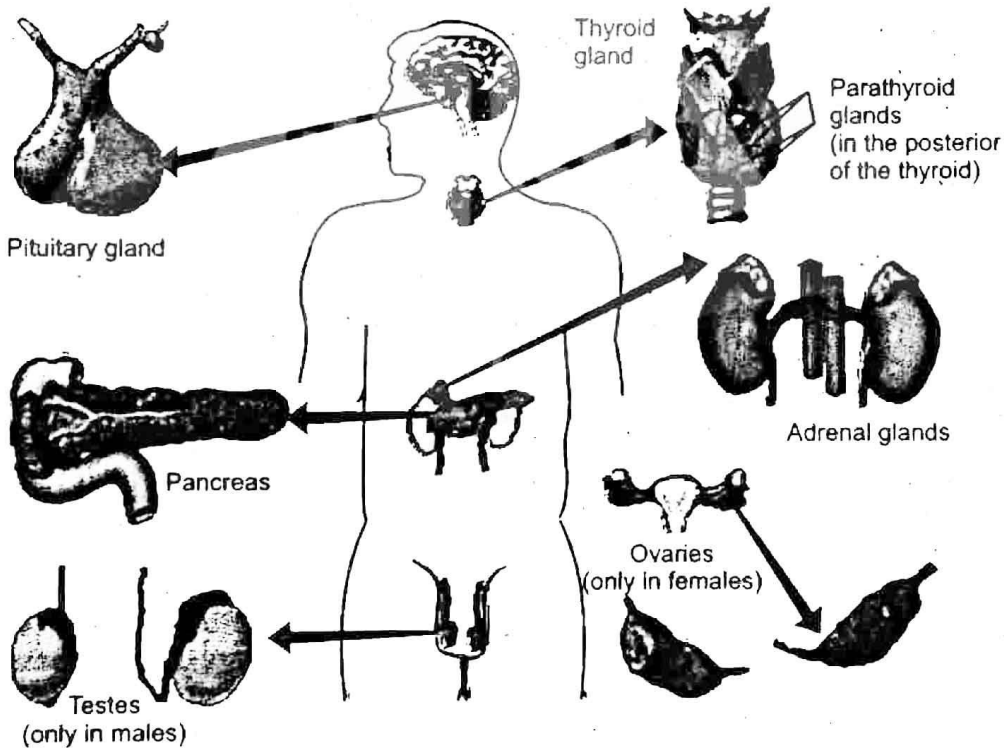


Figure 12.12: Endocrine Glands in Human body

Q.13 What do you mean by feedback Mechanism? Explain.

Ans. Feedback Mechanism

Endocrine glands do not secrete their hormones at a constant rate. The rate varies with the needs of the body. Like many other functions in body, the secretion of hormones is also regulated by feedback mechanisms.

Definition:

Feedback mechanism means the regulation of a process by the output of the same process.

Types:

Feedback mechanisms are of two types i.e. positive and negative feedbacks.

In negative feedback, the output of a process decreases or inhibits the process. This mechanism works to return a condition towards its normal value. For example, when the blood glucose concentration rises, pancreas secretes insulin. It decreases the blood glucose concentration. Decline in the blood glucose concentration to a normal set-point inhibits the secretion of insulin. In other words, the blood glucose concentration (output) controls the process i.e. the secretion of insulin and glucagon.

In positive feedback the changes resulting from a process increase the rate of process. For example, suckling action of an infant stimulates the production of a hormone in mother. This hormone works for the production of milk. More suckling leads to more hormones which in turn leads to more milk production.

Q.14 Explain the disorders of Nervous system.

Ans. Disorders of nervous system can be categorized into two main types i.e.

(i) Vascular Disorders

Vascular disorders are due to any disturbance in the blood supply to nervous system e.g. paralysis.

Paralysis

Paralysis is the complete loss of function by one or more muscle groups. Patients may have weak paralysis throughout his or her body or have paralysis in the lower extremities or in all four limbs

Causes

Following are the causes of paralysis:

(i) It is most often caused by damage to the central nervous system (brain or spinal cord). The damage may be due to stroke i.e. rupture in a blood vessel of brain or spinal cord.

(ii) Blood clotting in blood vessels.

(iii) Poison produced by polio viruses.

(ii) Functional Disorders

Functional disorders are due to any disturbance in nerve impulse generation and transmission e.g. epilepsy.

Epilepsy

Epilepsy is a nervous disorder in which there is abnormal and excessive discharge of nerve impulses in brain. It causes unprovoked seizures in patient. A seizure of epilepsy is a temporary abnormal state of brain marked by convulsions.

Causes

In younger people, epilepsy may be due to genetic or developmental causes.

In people over age 40 years brain tumours are more likely to cause epilepsy.

Head trauma and central nervous system infections may cause epilepsy at any age.

Cure

There is no known cure of epilepsy but medicines can control seizures.

Treatment

Patients of epilepsy have to take medicines daily for the treatment as well as the prevention of seizures. These medicines are termed as anticonvulsant or antiepileptic drugs.

Multiple Choice Questions

1. **Processes that carry nerve impulses away from the cell body are called;**
   (a) Axons
   (b) Dendrites
   (c) Synapses
   (d) Myelin sheath

2. **The portion of the nervous system that is involuntary in action:**
   (a) Somatic nervous system
   (b) Dendrites
   (c) Autonomic nervous system
   (d) Sensory nervous system

3. **Which neurons are present inside the central nervous system?**
   (a) Sensory neurons only
   (b) Motor neurons only
   (c) Sensory and motor neurons both
   (d) Interneurons only

4. **The part of the brain responsible for muscle movement, interpretation of the senses and the memory is the;**
   (a) Pons
   (b) Medulla oblongata
   (c) Cerebrum
   (d) Cerebellum

5. **Apart from hearing, what other major body function is performed by the ear?**
   (a) Hormones secretion
   (b) Body balance
   (c) Reduction in nerve pressure
   (d) All of these

6. **The myelin sheath is formed by _____ which wrap around the axons of some neurons;**
   (a) Nodes of Ranvier
   (b) Axons
   (c) Dendrites
   (d) Schwann Cells

7. **This is not a part of the hindbrain:**
   (a) Pons
   (b) Medulla oblongata
   (c) Cerebrum
   (d) Cerebellum

8. **If you look at an intact human brain, what you see the most is a large, highly convoluted outer surface. This is the;**
   (a) Cerebrum
   (b) Cerebellum
   (c) Pons
   (d) Medulla oblongata

9. **Insulin and glucagon are produced in the;**
   (a) Hypothalamus
   (b) Anterior pituitary
   (c) Liver
   (d) Pancreas

10. **All of these are hormones except:**
    (a) Insulin
    (b) Thyroxin
    (c) Glucagon
    (d) Pepsinogen

11. **The elongation of eye-ball results in:**
    (a) Myopia
    (b) Blindness
    (c) Deafness
    (d) None of these

12. **The pathway followed by the nerve impulses for producing a reflex action is called;**
(a) Reflex action
(b) Reflex arc
(c) Neuron
(d) Spinal cord

13. **Ali Ibn-e-Isa's book on study of diseases and surgery of eye is;**
(a) Biology
(b) Botany
(c) Ophthalmology
(d) Zoology

14. **A coordinated action has components;**
(a) 3 (b) 4
(c) 5 (d) 6

15. **The organs which are specifically built to detect particular type of stimulus are called;**
(a) Receptors
(b) Effectors
(c) Stimuli
(d) All of these

16. **The structural and functional unit of nervous system is;** (B 2013)
(a) Brain (b) Hormone
(c) Neuron (d) Effector

17. **The nervous system consists of billions of neurons and;**
(a) Hormones
(b) Nephrons
(c) Neuroglial cells
(d) Receptors

18. **Nucleus and cytoplasm of neuron is located in;**
(a) Cell body
(b) Dendrites
(c) Axons
(d) Myelin sheath

19. **The sensory layer of eye is;**
(a) Cornea (b) Iris
(c) Sclera (d) Retina

20. **The sensory part of ear is;**
(a) Succulus (b) Stapes
(c) Vestibule (d) Cochlea

21. **Ibn-al-Haytham is famous for his book of:**
(a) Chemistry
(b) Optics
(c) Biology
(d) Coordination

22. **_____is unable to see during day time.**
(a) Rabbit (b) Owl
(c) Cat (d) Human

23. **Which one is the smallest bone of human body?**
(a) Malleus (b) Incus
(c) Stapes (d) Cochlea

24. **_____ gland is pea-shaped.**
(a) Hypothalamus
(b) Pancreas
(c) Pituitary
(d) Adrenal

25. **_____ separates the middle ear from inner ear.**
(a) Malleus
(b) Stapes
(c) Incus
(d) Eustachian tube

26. **Non-Myelinated points between the myelin on an axon are:**
(a) Saltatory nerves
(b) Nodes of Ranvier
(c) Neuroglial cells
(d) Schwann cells

27. **Glucagon is secreted by _____.**

(a) Exocrine part of pancreas
(b) Islets of Langerhans
(c) Pituitary Gland
(d) None of these

28. **_____are sensitive to dim light.**

(a) Rods
(b) Cones
(c) Retina
(d) Cornea

29. **Night blindness is caused due to the deficiency of ___ in body.**

(a) Vitamin A (b) Iodopsin
(c) Protein (d) Fats

30. **The lens found in human eye is;**

(a) Biconcave
(b) Biconvex
(c) Both a and b
(d) None of these

31. **Lobe concerned with senses of hearing and smell:**

(a) Frontal (b) Parietal
(c) Occipital (d) Temporal

32. **The largest part of the fore-brain that controls skeletal muscles, thinking, intelligence and emotions;** **(Board 2013)**

(a) Cerebellum
(b) Cerebrum
(c) Hypothalamus
(d) Thalamus

33. **This is not the part of hind brain:**

(a) Pons
(b) Medulla Oblongata
(c) Cerebrum
(d) Cerebellum

34. **The hormone calcitonin is secreted by:**

(a) Pituitary gland
(b) Thyroid gland
(c) Pancreas
(d) Adernal gland

35. **Central nervous system consists of brain and:**

(a) Effectors
(b) Receptors
(c) Nerves
(d) Spinal cord

36. **Under the influence of which hormone of pituitary gland throxine and calcitonin is produced?**

(a) Thyroid stimulating hormone
(b) Glucagon
(c) Testosterone
(d) Androgens

37. **Which part of human body plays role in balancing the body:**

(a) Eye (b) Ear
(c) Nose (d) Teeth

38. **Female secondary sex characters are controlled by:**

(a) Estrogen
(b) Progesterone
(c) Testosterone
(d) Estrogen and Progesterone

39. **Functional disorder of nervous system is:**

(a) Dwarfism
(b) Paralysis
(c) Epilepsy
(d) Gigantism

40. **Father of Optics is:**
(a) Newton
(b) Ali Ibn Isa
(c) Ibn-al-Haytham
(d) Al-Farabi

41. **Rods and Cones are absent in:**
(a) Optic disc
(b) Blind spot
(c) Retina
(d) Optic Disc and blind spot

42. **Muscular ring formed by choroid is:**
(a) Cornea (b) Pupil
(c) Iris (d) Sclera

43. **Pairs of Cranial nerves are:**
(a) 21 (b) 12
(c) 33 (d) 3

44. **Pairs of Spinal nerves are:**
(a) 2 (b) 33
(c) 31 (d) 12

45. **A connection between cerebellum and spinal cord is:**
(a) Medulla oblongata
(b) Mid brain
(c) Pons
(d) Cerebrum

46. **Brain stem involves:**
(a) Medulla oblongata and Pons
(b) Cerebrum
(c) Mid brain
(d) Medulla oblongata, Pons and Mid brain

47. **Which lobe permits conscious control of skeletal muscles?**
(a) Frontal (b) Occipital
(c) Parietal (d) Temporal

48. **Visual information is received and analysed by which lobe?**
(a) Frontal (b) Occipital
(c) Temporal (d) Parietal

49. **Sensation of smell is created by:**
(a) Cerebrum
(b) Cortex
(c) Olfactory bulbs
(d) Medulla

50. **Which lobe co-ordinates movements involved in speech?**
(a) Frontal (b) Parietal
(c) Occipital (d) Temporal

51. **Layers of brain are called:**
(a) Cranium
(b) Meninges
(c) Lobes
(d) Central canal

52. **Cerebrospinal fluid is present in:**
(a) Ventricles
(b) Central canal
(c) Ventricles and Central canal
(d) Meninges

53. **Sound receptor cells are present in;**
(a) Succulus (b) Stapes
(c) Vestibule (d) Cochlea

54. **The special neuroglial cells located at regular intervals along axons are called:**
(a) Dendrites
(b) Myelin sheath
(c) Schwann cells
(d) Nodes of Ranvier

55. **Which of the following contains sensory areas that received impulses from skin?**
(a) Frontal Lobe
(b) Occipital Lobe
(c) Temporal Lobe
(d) Parietal Lobe

56. **In reflex action, which of the following acts as co-ordinator?**
(a) Brain
(b) Neurons
(c) Reflex Arc
(d) Spinal Cord

57. **Progesterone is secreted by:**
(a) Pancreas
(b) Adrenal glands
(c) Testes
(d) Ovaries

58. **For farsightedness the image is formed:**
(a) Behind the retina
(b) In front of retina
(c) On the retina
(d) On blind spot

59. **The length of spinal cord is:**
(a) 20 cm (b) 30 cm
(c) 40 cm (d) 50 cm

60. **A pigment Iodopsin is present in:**
(a) Rods (b) Cones
(c) Cornea (d) Sclera

61. **Convex lens is used to rectify which problem?**
(a) Hypermetropia
(b) Short sightedness
(c) Night blindness
(d) Myopia

62. **Auditory canal ends in:**
(a) Cochlea
(b) Ear drum
(c) Middle ear
(d) Eustachian tube

63. **Hyperthyroidism is caused by:**
(a) Overproduction of Thyroxin
(b) Under production of Thyroxin
(c) Overproduction of Insulin
(d) Overproduction of glucagon

64. **Parathormone is secreted by:**
(a) Parathyroid gland
(b) Thyroid gland
(c) Adrenal gland
(d) Gonads

65. **Which hormone prepares body to overcome emergency situation?**
(a) Parathormone
(b) Vasopressin
(c) Thyroxin
(d) Adrenaline

66. **The pathway which conduct impulses from CNS to effectors?**
(a) Sensory pathway
(b) Motor pathway
(c) Mixed pathway
(d) Interneuron pathway

67. **In unicellular organisms, co-ordination is brought about by:**
(a) Nerves
(b) Chemicals
(c) Brain
(d) Brain and nerves

68. **Brain and Spinal cord are examples of:**
(a) Stimuli
(b) Receptors
(c) Coordinators
(d) Effectors

69. **Endocrine glands are:**
(a) Effectors
(b) Coordinators
(c) Receptors
(d) Stimuli

70. **In some parts of the body many Neurons cell bodies combine to make a group:** **(Board 2014)**
(a) Nerves (b) Tissues
(c) Ganglion (d) Muscles

71. **In Auditory Canal's wall special glands producer:** (Board 2014)
(a) Wax
(b) Blood
(c) Auditory Fluid
(d) Nerve impulse

72. **If a new born baby feeds on mother's milk, as a result of which production of mother's milk will,** (Board 2014)
(a) Decrease (b) Increase
(c) Stop
(d) Continue with intervals

73. **Which hormone is secreted in case of emergency situation:** (Board 2014)
(a) Oxytocin
(b) Thyroxin
(c) Adrenaline
(d) Calcitonin

Answer Key

1	a	2	c	3	d	4	c	5	b
6	d	7	c	8	a	9	d	10	d
11	a	12	b	13	c	14	c	15	a
16	c	17	c	18	a	19	d	20	d
21	b	22	b	23	c	24	c	25	b
26	b	27	b	28	a	29	a	30	b
31	d	32	b	33	c	34	b	35	d
36	a	37	b	38	d	39	c	40	c
41	d	42	c	43	b	44	c	45	c
46	d	47	a	48	b	49	c	50	a
51	b	52	c	53	d	54	c	55	d
56	d	57	d	58	a	59	c	60	b
61	a	62	b	63	a	64	a	65	d
66	b	67	b	68	c	69	a	70	c
71	a	72	b	73	c				

Short Questions

Q.1 Identify the two types of co-ordination in living organisms. (Board 2013)

Ans. There are two types of coordination in organisms:

(i) Nervous coordination brought about by nervous system.

(ii) Chemical coordination brought about by endocrine system.

Q2. Differentiate between modes of nervous and chemical coordination's.

Ans.

Sr. No.	Components	Nervous Coordination	Chemical Coordination
1	Stimulus	Sense Organs	Body part
2	Sending of message	Neuron	Blood
3	Coordinators	Brain and spinal cord	Endocrine gland
4	Form of message	Nerve impulse	Chemical
5	Response	Muscle or gland (effectors)	Bones, liver etc

Q3. What are the main components of coordination? (Board 2013)

Ans. A coordinated action has five components:

(i) Stimulus (ii) Receptor

(iii) Coordinator (iv) Effector

(v) Response

Q4. Define reflex action and reflex arc.

Ans. Reflex action

When the involuntary response produced by the CNS is very quick, such response is called reflex action.

Reflex arc

The pathway followed by the nerve impulse for producing a reflex action is called reflex arc.

Q5. Trace the path of a nerve impulse in case of a reflex action.

Ans. Stimulus ⟶ Receptor ⟶ Coordinator ⟶ Effector ⟶ Response

Q6. Describe the pupil reflex in dim and bright light. 12(053)

Ans. Pupil constricts in bright light when the circular muscles of iris contract. Similarly, pupil dilates in dim light when the radial muscles of iris contract.

Q7. How would you associate the role of vitamin A with vision and effects on retina?

Ans. Rods contain a pigment called rhodopsin. When light falls on rhodopsin it breaks for generating a nerve impulse. In the absence of light, the break down products are again converted into rhodopsin. Body synthesizes rhodopsin from vitamin A and that is why the deficiency of vitamin A causes poor night vision.

Q8. Define the terms hormone and endocrine system.

Ans. Hormone

A hormone is a specific messenger molecule synthesized and secreted by an endocrine gland.

Endocrine system

The system which regulates the activities of growth, reproduction, maintenance of glucose concentration in blood, reabsorption of water in kidneys is called endocrine system.

Q9. What is hypothalamus?

Ans. Introduction

It lies above midbrain and just below thalamus. In humans it is roughly the size of an almond.

Functions

(i) It links the nervous system and endocrine system.

(ii) It controls the secretions of pituitary gland.

(iii) It also controls feelings such as rage, pain, pleasure and sorrow.

Q10. What is iodopsin?

Ans. Cone cells in retina of eye contains a pigment known as iodopsin. Three types of cones have specific iodopsin. Each cone helps in recognizing three primary colours.ie, red, blue and green.

Q11. Define islets of Langerhans.

Ans. Some portions of pancreas serve as ductless (endocrine) gland. This portion contains groups of endocrine cells referred to as islets of Langerhans. These islets secrete two hormones i.e. insulin and glucagon which maintain amount of glucose in the blood.

Q12. What is nerve impulse?

Ans. In nervous coordination, brain and spinal cord receive information and send messages through neurons in the form of nerve impulses. A nerve impulse is wave of electrochemical changes that travels along the length of neurons.

Q13. What is tympanum?

Ans. In the ear, auditory canal ends in tympanum (eardrum). This thin membrane separates external ear from middle ear.

Q14. What is vitreous humour? **(Board 2014)**

Ans. The iris divides the cavity of eye into two chambers. The posterior chamber is between iris and retina and contains a jelly-like fluid known as vitreous humour.

Q15. Define Acromegaly.

Ans. Abnormal growth due to excessive production of growth hormone after **growing age,** the internal organs and body extremities alone grow large and affected persons have large hands, feet and jawbones.

Q16. Define Antidiuretic hormone.

Ans. The hormone of the posterior pituitary which promotes the reabsorption of water in renal tubules.

Q17. Define Aqueous humour.

Ans. The fluid present in the anterior chamber of the eye i.e. between the cornea and the iris.

Q18. Define Axon.

Ans. A long fibre of neuron that carries nerve impulse away from the cell body of a neuron.

Q19. Define Cell body.

Ans. The part of the nerve cell that contains nucleus and cytoplasm.

Q20. Define Cerebellum.

Ans. The part of the hindbrain which controls muscle movements.

Q21. Define Cerebral hemispheres.

Ans. The division of the cerebrum of the brain into two parts called cerebral hemispheres.

Q22. Define Cerebrospinal fluid (CSF).

Ans. The fluid in the ventricles of the brain and in the central canal of the spinal cord is called CSF.

Q23. Define Cerebrum.

Ans. The largest part of the forebrain; controls many sensory and motor functions.

Q24. Define Cochlea.

Ans. The part of the inner ear; consists of three ducts wrapped in the form of a coiled tube, contains sound receptors.

Q25. Define Colour blindness.

Ans. Genetic disorder in which person fails to recognize the basic colours; blue, green and red.

Q26. Define Cones.

Ans. The photosensitive cells in the retina of the eye; sensitive to bright light and so distinguish different colours.

Q27. What is choroid?

Ans. The middle layer of eye is called choroid. It contains blood vessels and gives the eye a dark colour which prevents disruptive reflections within eye.

Q28. Define Cornea.

Ans. The transparent part of sclera that forms in the front of the eye through which light enters the eye.

Q29. What are Cranial nerves?

Ans. Nerves that arise from or lead to the brain.

Q30. Define dendrites.

Ans. Short and branched projections of neuron's cell body which transmit nerve impulse towards cell body are called Dendrites.

Q31. What is Diabetes mellitus?

Ans. More than normal level of glucose in blood, a condition caused by insufficient concentration of insulin in blood, is called diabetes mellitus.

Q32. What is the cause of dwarfism? (Board 2014)

Ans. Less than normal body growth; a condition caused when growth hormone is insufficient during the growing age.

Q33. What is Ear drum or Tympanic membrane?

Ans. Tympanic membrane; A membrane stretched across the inner end of the auditory canal of the ear is called eardrum.

Q34. What are Effectors?

Ans. The parts of the coordination system that respond when stimulated by nerve impulses or hormones.

Q35. Define Endocrine gland.

Ans. A ductless gland produces secretions which release directly into the blood stream is called endocrine gland.

Q36. What is Epilepsy?

Ans. A nervous disorder characterized by recurrent unprovoked seizures (convulsions).

Q37. What is Epinephrine?

Ans. It is also called adrenaline or emergency hormone it is secreted by adrenal gland.

Q38. Define Estrogen.

Ans. A hormone secreted by the ovaries; promotes development of female secondary sex characteristics and regulates the reproductive cycle.

Q39. Define Eustachian tube.

Ans. The tube between middle ear and the nasal cavity that equalizes the pressure on both sides of the eardrum.

Q40. Define Exocrine gland.

Ans. A gland that discharges its secretion into a duct e.g. digestive glands, skin glands.

Q41. What is Ganglion?

Ans. The aggregation of the cell bodies of neurons is called ganglion.

Q42. Define Grey matter.

Ans. The nervous tissue containing cell bodies and non myelinated processes of the neurons.

Q43. Define Hormone.

Ans. A substance that is secreted by an endocrine gland directly into blood and that produces a specific effect on a particular tissue. E.g., vasopressin, oxytocin, thyroxin etc.

Q44. What is Hypermetropia?

Ans. The condition in which a person is not able to see nearer objects clearly; the eyeball shortens and image is formed behind the retina.

Q45. What is Hyperthyroidism?

Ans. The over-production of thyroxin results in increase of energy production, increased heart-beat, frequent sweating and shivering of hands.

Q46. What is Insulin?

Ans. The hormone produced by the Islets of Langerhans; lowers the blood glucose level is called insulin.

Q47. What is difference between sensory neurons and interneurons? (B-2014)

Ans. Sensory Neurons:

Conduct sensory information (nerve impulse) from receptors towards the CNS, sensory neurons have one dendrites and one axon.

Interneurons

The neurons present in the brain and spinal cord are called Interneurons. They receive information, interpret them and stimulate motor neurons. They have many dendrites and axons.

Q48. Define Iris.

Ans. A muscular ring formed by the bending of the choroid behind the cornea of the eye.

Q49. What is Medulla oblongata?

Ans. Part of the hindbrain; on the top of the spinal cord; controls breathing, heart rate, blood pressure and many reflexes.

Q50. What are Meninges?

Ans. Three layers around the brain and the spinal cord; protect them and provide nutrients and oxygen through their capillaries.

Q51. Define Mixed nerves.

Ans. The nerves containing axons of both the sensory and motor neurons are called mixed nerves. e.g. all spinal nerves are mixed in nature.

Q52. Define Motor nerves.

Ans. The nerves which contain the axons of motor neurons only are called motor nerves.

Q53. Define Myelin sheath.

Ans. The insulating sheath around the axons of some neurons is called myelin sheath.

Q54. What is Myopia.

Ans. The condition in which a person is not able to see distant objects clearly; happens due to elongation of the eyeball and image is formed in front of retina.

Q55. Define Nerve.

Ans. The union of several axons that are enveloped by a covering made of lipid.

Q56. Define Neuron.

Ans. Nerve cell or neuron the unit of the nervous system; able to conduct nerve impulses is called neuron.

Q57. What are nodes of Ranvier?

Ans. The non-myelinated points between the areas of myelin on the axons of neurons.

Q58. Define Optic disc.

Ans. It is also called blind spot. It is a point on the retina of the eye where the optic nerve enters the retina; no photosensitive cells exist at this point.

Q59. What is Oxytocin?

Ans. The hormone secreted by the posterior lobe of pituitary gland; stimulates the contraction of uterus walls in females for child birth; necessary for ejection of milk from the breasts.

Q60. What is Paralysis?

Ans. Complete loss of function by one or more muscle groups due to damage in the nervous system is called Paralysis.

Q61. Define Parathormone.

Ans. This hormone of the parathyroid glands increases the level of calcium ions in the blood.

Q62. Define Parathyroid gland.

Ans. The endocrine glands located on the posterior sides of the thyroid gland secretes parathormone.

Q63. Define Pituitary gland.

Ans. The endocrine gland attached to the hypothalamus that controls many other endocrine glands in the body.

Q64. What are Pons?

Ans. Part of the hindbrain; present on top of the medulla; assists the medulla in controlling breathing and serves as a connection between the cerebellum and the spinal cord.

Q65. Define Progesterone.

Ans. A hormone secreted by ovaries that maintains the uterus during pregnancy is called progesterone.

Define Pupil.

The opening in the centre of the iris of the eye is called pupil.

Define Receptors.

The organs, tissues or cells which detect particular type of stimuli. e.g. eyes, ear etc.

What is Reflex arc?

The nerve pathway over which the nerve impulses travel in a reflex action.

Define Retina.

The innermost and the sensitive layer in the eye is called retina.

Q70. Define Rhodopsin.

Ans. A pigment present in the rods of the retina.

Q71. What are Rods?

Ans. The photosensitive cells present in the retina of the eye sensitive to dim light.

Q72. What are Schwann cells?

Ans. The supporting cells around neurons, form the myelin sheath.

Q73. Define Sclera.

Ans. The tough, white outer layer of the eye which protects the eye.

Q74. What are Semicircular canals?

Ans. The three canals present posterior to the vestibule in the inner ear.

Q75. What are sensory nerves?

Ans. The nerves which contain only the axons of sensory neurons.

Q76. Define Somatotrophin.

Ans. It is also called growth hormone. A hormone of the anterior lobe of pituitary gland promotes the growth of the body.

Q77. What are Spinal nerves?

Ans. The nerves which arise from the spinal cord.

Q78. Define Suspensory ligament.

Ans. The ring that attaches the lens of the eye to the ciliary muscles.

Q79. What is Testosterone?

Ans. The male sex hormone secreted by testis; stimulates the development of male reproductive system and the male secondary sex characteristics.

Q80. Define Thalamus.

Ans. The part of the forebrain; serves as a relay centre between various parts of the brain and spinal cord.

Q81. What is Thyroid?

Ans. The endocrine gland located in front of the trachea; secretes hormones, thyroxin and calcitonin.

Q82. Define Thyroxin.

Ans. The hormone of the thyroid gland increases the breakdown of food and release of energy; also responsible for the growth of body.

Q83. What is Vasopressin?

Ans. Antidiuretic hormone; the hormones secreted by the posterior lobe of pituitary gland; responsible for the reabsorption of water from renal tubules of the nephron.

Q84. What is Vestibule?

Ans. Part of the inner ear, helps to maintain balance of the body.

Q85. Define Brain stem.

Ans. The medulla oblongata, pons and midbrain connects the rest of brain to spinal cord. This is called brain stem.

Q86. What is nerve-growth factor?

Ans. Unlike ordinary cells, mature neurons never divide. But a protein called nerve-growth factor promotes the regeneration of broken nerve cells. The degenerating brain cells could be repaired by using embryonic stem cells.

Q87. What do you know about deafness?

Ans. Introduction

It is a state in which hearing is not possible.

Causes

(i) The defect of ear drum, cochlea, middle ear, ossicles or auditory nerve may cause deafness.

(ii) Infection in Eustachian tube may spread to middle ear too.

(iii) Ear drum may be damaged by an infection in auditory canal.

(iv) Excessive noise, strong blows on cheek, pointed objects entering auditory canal and attack from insects may also affect hearing.

Q88. How thundering and lightning is produced?

Ans. A thunderstorm is characterized by the presence of lightning and a thunder.

(a) Lightning

The lightning is caused by an electrical charge due to the movement of water droplets or crystals carried by wind.

(b) Thunder

The sudden increase in pressure and temperature from lightening produces a sound of thunder.

Q89. Why the flash of lightning is followed after some seconds by a roar of thunder?

Ans. This time difference is due to the fact that sound travels slower than light.

Q90. What are the functions of hormones in animals?

Ans. Following are the functions of hormones in animals:

(i) Stepwise process of metamorphosis

(ii) Cell division in invertebrates

(iii) Migration in birds

Q91. Why the urine output is low in summer?

Ans. Due to increased sweating, the water level of blood is lowered. As a result, pituitary gland releases more Antidiuretic hormone (ADH) into blood which lowers the amount of urine.

Q92. What is Tetany?

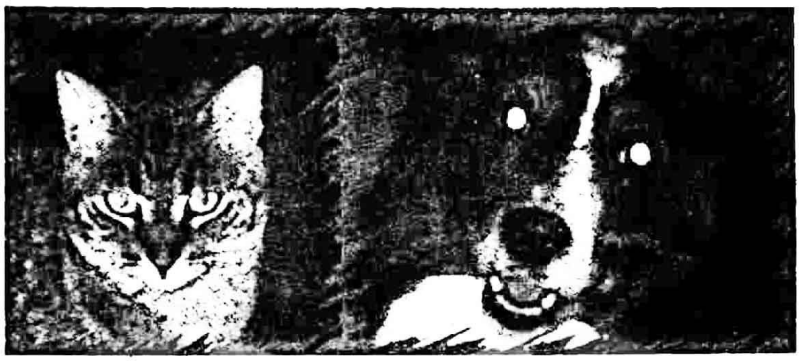
Ans. It is marked by sharp flexion of the wrist and ankle joints, muscle twitching, cramps and convulsions. It is due to decreased blood calcium level.

Q93. What is BGC test?

Ans. The amount of glucose in blood is measured by BGC (Blood Glucose Concentration test). It is used to diagnose diabetes. The blood glucose concentration is maintained at the rate of 80 to 120 mg per 100 ml of blood.

Q94. Why the eyes of cat and dog shine in the night?

Ans. The reason for this is the presence of tapetum behind the eye which is a layer capable of reflecting light.



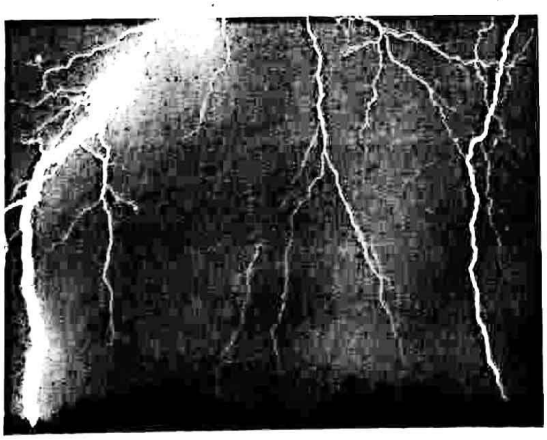
Q 95. Why Owl is not able to see during day time?

Ans. The reason for this is the deficiency of cones which receive and sense the bright light. But the presence of more rods gives it greater power of vision during night. All animals that search for prey during night have this characteristic.



Q96. What do you know about lightening and thunder?

Ans. Lightening is caused by an electrical charge due to the movement of water droplets or crystals carried by the wind. The sudden increase in pressure and temperature from lightening produces rapid expansion of the air. This expansion of air produces a sound of thunder.



Q97. Define coordination and give example. **(Board 2013)**

Ans. Definition: The coordination is developed when body works as one unit in which its different organs and systems co-operates and work in harmony with each other.

Example:

When we are writing something, our hands and fingers work in collaboration with our muscles, eyes, thoughts etc. and then very intricate movements result.

Q98. Write names of three main parts of brain. **(Board 2013)**

Ans. Three main parts of brain are:

a. Forebrain b. Midbrain c. Hindbrain

Q99. What is salutatory impulse? **(Board 2013)**

Ans. In a neuron, impulses 'jump' over the areas of myelin going from node to node. Such impulses are called salutatory impulses. This increases the speed of nerve impulse.

Q100. Define coordinators. Give an example also. **(Board 2014)**

Ans. Definition:

These are the organs that receive information from receptors and send messages to particular organs for proper action.

Examples:

i. In nervous co-ordination, brain and spinal cord are coordinators.

ii. In chemical coordination, various endocrine glands play the role of coordinators.

Q101. Define Reflex action with example. **(Board 2014)**

Ans. Definition:

Sometimes the involuntary action produced by the CNS is very quick. Such a response is called reflex action.

Example

The most common example of reflex action is the withdrawal of hand after touching a hot object.